

That which is claimed is:

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1. ~~Isolated nucleic acid encoding a mammalian SCA2 polypeptide.~~

2. Isolated nucleic acid according to claim 1, wherein said nucleic acid comprises DNA.

3. DNA according to claim 2, wherein said DNA is a cDNA.

Sub B2
4. DNA according to claim 2, wherein said DNA encodes at least about 10 contiguous amino acids set forth in SEQ ID NO:3, or SEQ ID NO:5.

5. DNA according to claim 2, wherein said DNA hybridizes under high stringency conditions to the SCA2 coding portion of nucleotides 1 - 516 of SEQ ID NO:1 or nucleotides 163-4098 of SEQ ID NO:2, or SEQ ID NO:4.

6. DNA according to claim 2, wherein said DNA has substantially the same nucleotide sequence as the SCA2 coding portion set forth in SEQ ID NO:2, or SEQ ID NO:4.

7. A vector comprising DNA according to claim 2.

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8. A host cell containing a vector according to claim 7, wherein said cell is a procaryotic cell or a eucaryotic cell.

9. A host cell according to claim 8, wherein said cell expresses a functional SCA2 protein.

10. An oligonucleotide comprising at least 15 nucleotides capable of specifically hybridizing with a

sequence of nucleic acids of the nucleotide sequence set forth in SEQ ID NO:2, or SEQ ID NO:4.

11. An oligonucleotide according to claim 10, wherein said oligonucleotide is labeled with a detectable marker.

12. A kit for detecting mutations and in chromosome 12 at the SCA2 locus in 12q24.1 comprising at least one oligonucleotide according to claim 10.

13. Isolated mRNA complementary to DNA according to claim 2.

14. An oligonucleotide composition comprising chemical analogues of the nucleic acid of claim 2 operatively linked to a promoter of RNA transcription.

15. An antisense oligonucleotide capable of specifically binding to and inhibiting the translation of mRNA according to claim 13.

16. Isolated SCA2 polypeptide, or fragments thereof, and functional equivalents thereof.

17. Isolated SCA2 polypeptide according to claim 16, wherein said polypeptide has at least substantially the same amino acid sequence as that set forth in SEQ ID NO:3, or at least amino acids 1-165 or amino acids 188-1312 of SEQ ID NO:3, or substantially the same amino acid sequence as that set forth in SEQ ID NO:5.

18. Isolated SCA2 polypeptide according to claim 16, wherein said polypeptide has the same amino acid sequence as that set forth in SEQ ID NO:3, or at

~~least amino acids 1-165 or amino acids 188-1312 of SEQ ID NO:3, or in SEQ ID NO:5.~~

19. Isolated SCA2 polypeptide according to claim 16, wherein said polypeptide is encoded by a nucleotide sequence that is substantially the same nucleotide sequence as that set forth in SEQ ID NO:2, or at least nucleotides 163-4098 of SEQ ID NO:2, or SEQ ID NO:4.

20. Isolated SCA2 polypeptide according to claim 16, wherein said polypeptide is encoded by at least nucleotides 163-4098 set forth in SEQ ID NO:2, or SEQ ID NO:4.

21. An SCA2 polypeptide expressed recombinantly in a host cell.

22. An SCA2 polypeptide according to claim 21, wherein said polypeptide is encoded by a nucleotide sequence that is substantially the same as at least nucleotides 163-4098 set forth in SEQ ID NO:2, or SEQ ID NO:4.

23. An SCA2 polypeptide according to claim 21, wherein said polypeptide is encoded by at least nucleotides 163-4098 set forth in SEQ ID NO:2, or SEQ ID NO:4.

~~24. An antibody that specifically binds to a determinant on a SCA2 polypeptide according to claim 16, or active fragment thereof.~~

25. An antibody according to claim 24, wherein ~~said antibody is a monoclonal antibody.~~

~~26. An antibody according to claim 24, wherein said antibody is a polyclonal antibody.~~

~~27. A composition comprising an amount of the antisense oligonucleotide according to claim 13 effective to modulate expression of a human SCA2 polypeptide and an acceptable hydrophobic carrier capable of passing through a cell membrane.~~

28. A composition according to claim 27, wherein the oligonucleotide is coupled to a substance which inactivates mRNA.

29. A composition according to claim 28, wherein said substance is a ribozyme.

30. A composition comprising an amount of an antibody according to claim 24 effective to block function of the SCA2 protein or to block interaction of the SCA2 protein with other proteins or ligands.

~~31. A transgenic nonhuman mammal expressing DNA encoding a SCA2 polypeptide according to claim 2.~~

32. A transgenic nonhuman mammal according to claim 31, wherein said DNA encoding said polypeptide has been mutated as to be incapable of normal polypeptide activity, and wherein the polypeptide so expressed is not native SCA2 polypeptide.

33. A transgenic nonhuman mammal, the genome of which comprising antisense DNA complementary to DNA encoding a SCA2 polypeptide according to claim 2, wherein said antisense DNA is transcribed into antisense mRNA complementary to mRNA encoding a human SCA2 polypeptide.

~~34. A transgenic nonhuman mammal according to claim 31, wherein said DNA is operatively linked to an inducible promoter.~~

35. A transgenic nonhuman mammal according to claim 31, wherein said DNA is operatively linked to tissue specific regulatory elements.

~~36. A transgenic nonhuman mammal according to claim 31, wherein the transgenic nonhuman mammal is a mouse.~~

37. A method for identifying nucleic acids encoding a human SCA2 protein, said method comprising:
contacting a sample containing nucleic acids with a probe according to claim 11, wherein said contacting is effected under high stringency hybridization conditions, and identifying compounds which hybridize thereto.

~~38. A method for identifying compound(s) which bind to a human SCA2 polypeptide, said method comprising contacting cells according to claim 9 with said compound(s) and identifying compounds which bind thereto.~~

39. A method for detecting the presence of a human SCA2 polypeptide, said method comprising contacting a test sample with an antibody according to claim 24, detecting the presence of an antibody-SCA2 complex, and therefor detecting the presence of a human SCA2 polypeptide in said test sample.

40. Single strand DNA primers for amplification diagnosis of SCA2, wherein said primers comprise a nucleic acid sequence derived from the nucleic acid according to claim 1 set forth as SEQ ID NO:2, or SEQ ID NO:4.

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~~41. A method for diagnosing spinocerebellar Ataxia Type 2, said method comprising:~~

~~detecting, in said subject, a genomic or transcribed mRNA sequence having an expanded CAG repeat at a location corresponding to between nucleotides 657 and 724 of SEQ ID NO:2.~~

42. A method for diagnosing spinocerebellar Ataxia Type 2, said method comprising:

a) contacting nucleic acid obtained from a subject suspected of having SCA2 with primers that amplify at least a nucleic acid fragment of SEQ ID NO:2 containing nucleotides 658-723 of SEQ ID NO:2, under conditions suitable to form a detectable amplification product; and

b) detecting an amplification product containing substantially expanded CAG repeats above normal, whereby said detection indicates that said subject has SCA2.

43. A diagnostic kit comprising at least one oligonucleotide according to claim 10 contained in a packaging material.

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